Long term monitoring of AGN in the gamma and neutrino Sky

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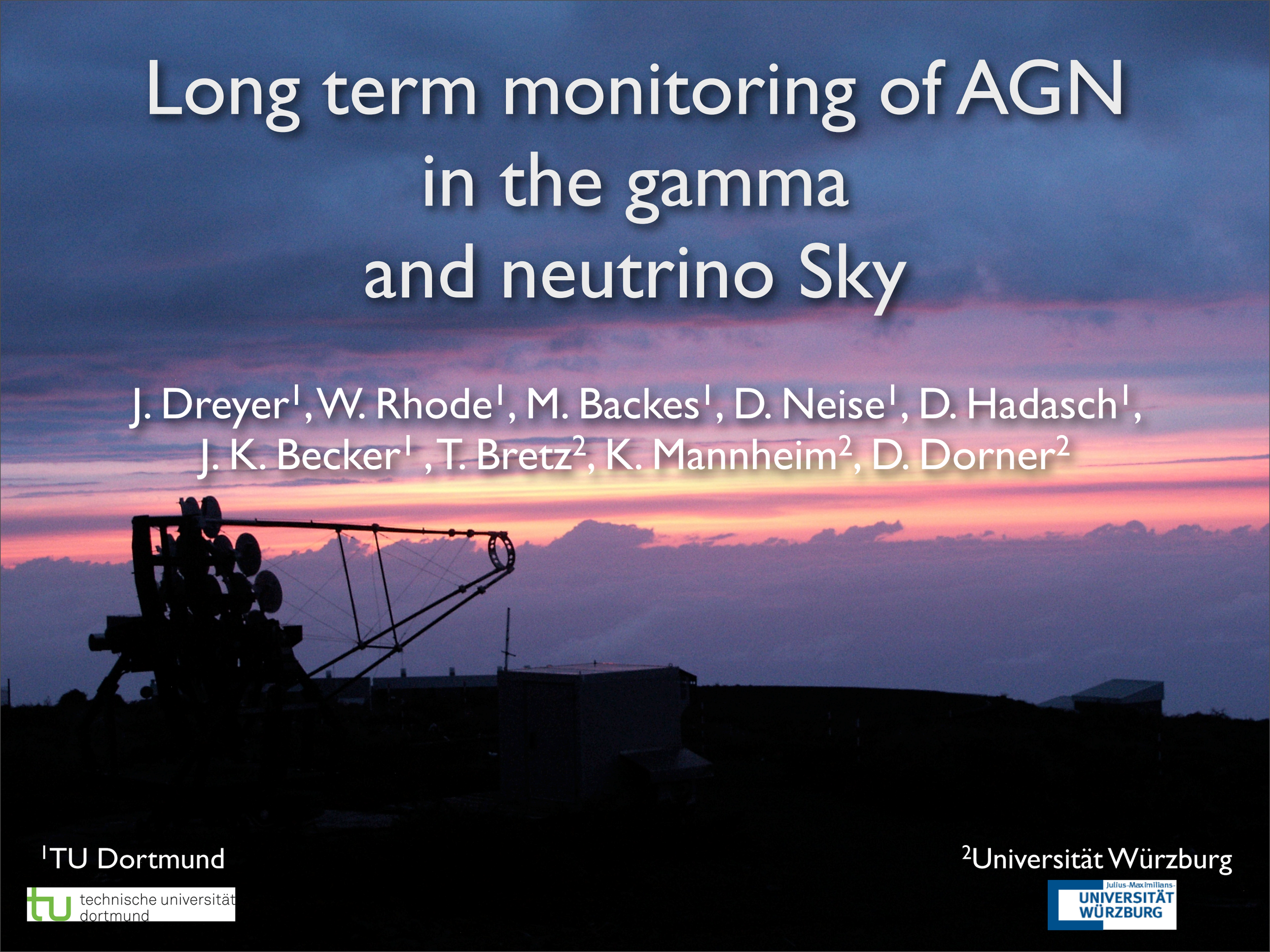

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Overview

- Motivation
- Present situation
- DWARF
- Vision
- Summary & outlook

Motivation

Long term monitoring of AGN should yield in:

- Better understanding of the origin of the jets
- Possible ToO observations with MAGIC, H.E.S.S. and VERITAS
- Coincident observations with IceCube and extended multi wavelength observations:
  - Better understanding of acceleration process (leptonic or hadronic)
  - Better modeling of the SED
- Possible discovery of binary black holes
- In case of an evidence for binary black holes:
  Basis for gravitational wave observations

Motivation

Long term monitoring of AGN should yield in:

- Better understanding of the origin of the jets
- Possible ToO observations with MAGIC, H.E.S.S. and VERITAS
- multi wavelength
- nic or hadronic)
- BG suppression by 2 orders of magnitude possible
- In case of an evidence for binary black holes:
  Basis for gravitational wave observations

If flares are known due to long term observations, IceCube analysis can be limited to flare states.

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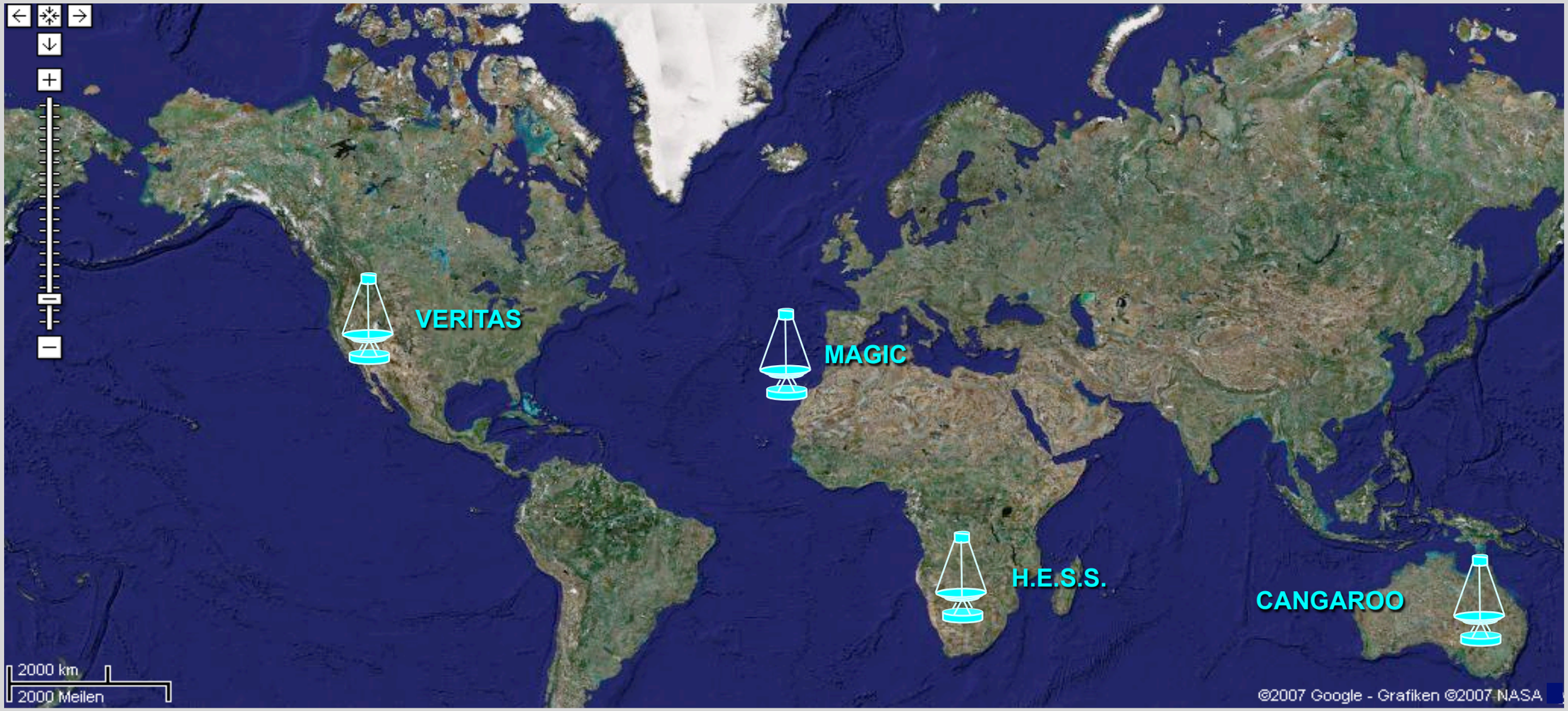
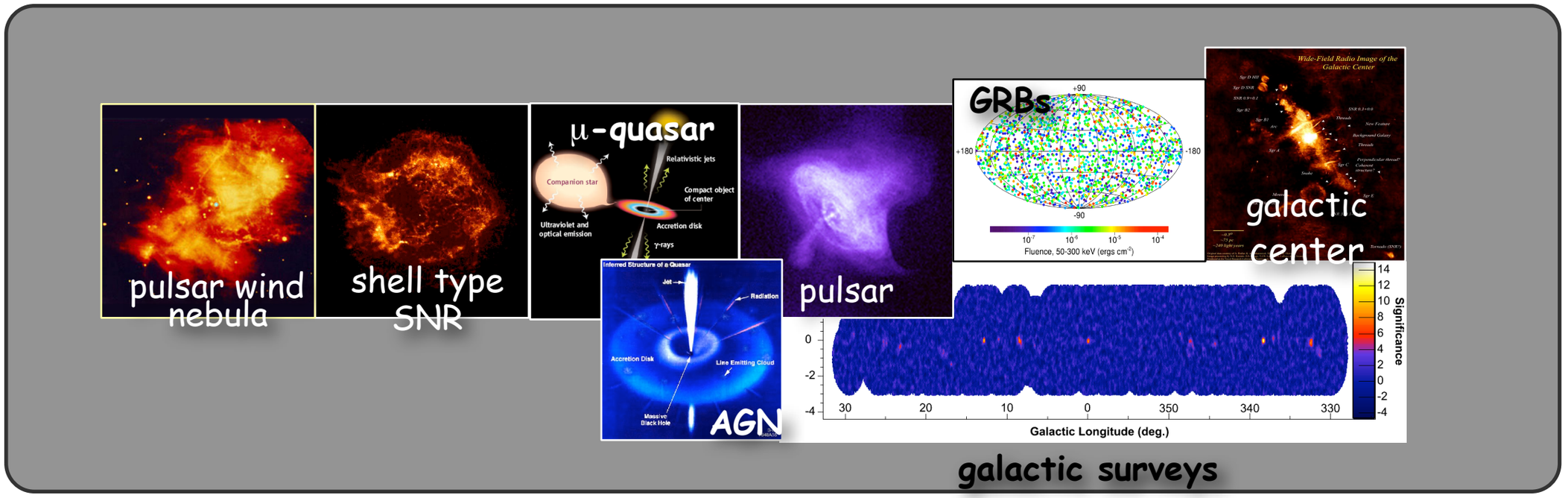
Existing IACTs



Why DWARF?

Existing IACTs have multiple observations to do:



$\Rightarrow$ no observation time for long term observations of bright AGNs

$\Downarrow$

Dedicated multiWavelength AGN Research Facility

MAGIC Site

(La Palma, Spain)

MAGIC Site

(La Palma, Spain)

HEGRA CT3

The HEGRA experiment was a system of 5 IACTs operating from 1992 until 2002.

- 8.5 m^2 (91.5 sq. ft.) mirror area
- 271 pixel camera
- 4.92 m (16 ft.) focal length
- 4.3° field of view
- Energy threshold ~ 700 GeV

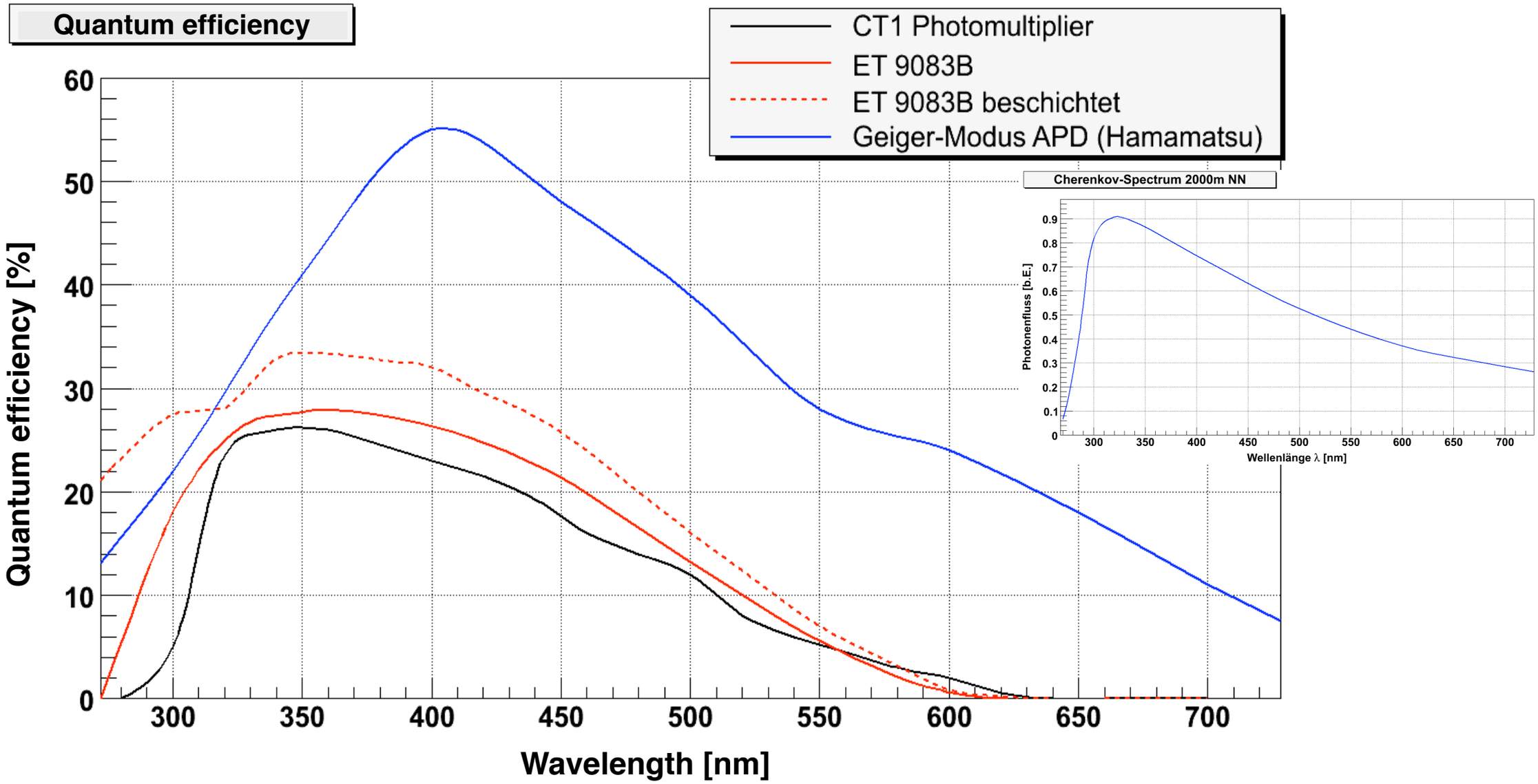
DWARF Setup

- Mirror area 13.5 m^2 (145 sq. ft.) (CT3: 8.5 m^2)
- Round camera with 313 pixels
  (CT3 used hexagonal geometry, 271 pixels)
- 4.57 m (14 ft.) focal length (CT3: 4.92 m)
- 5° Field of view (CT3: 4.3°)
- High QE PMTs
  (Geiger-Mode-APD)
- Hexagonal mirrors with
  higher reflectivity than CT3
  Winston-Cones
- Fast DAQ (DRS chip 2 GHz)
- Energy threshold ~ 310 GeV

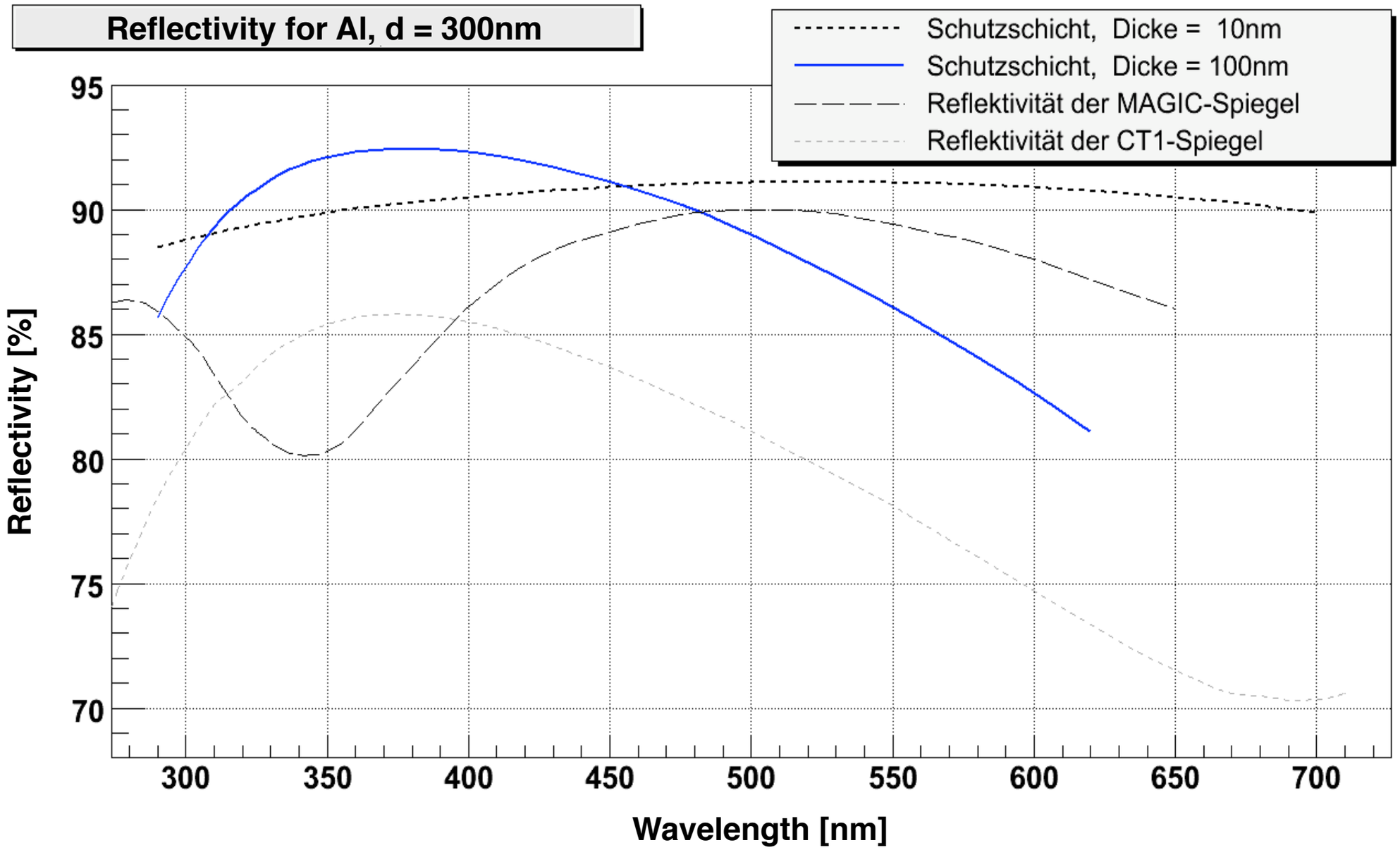
Photomontage by M. Backes

Key Values

Quantum efficiency for different possible PMTs

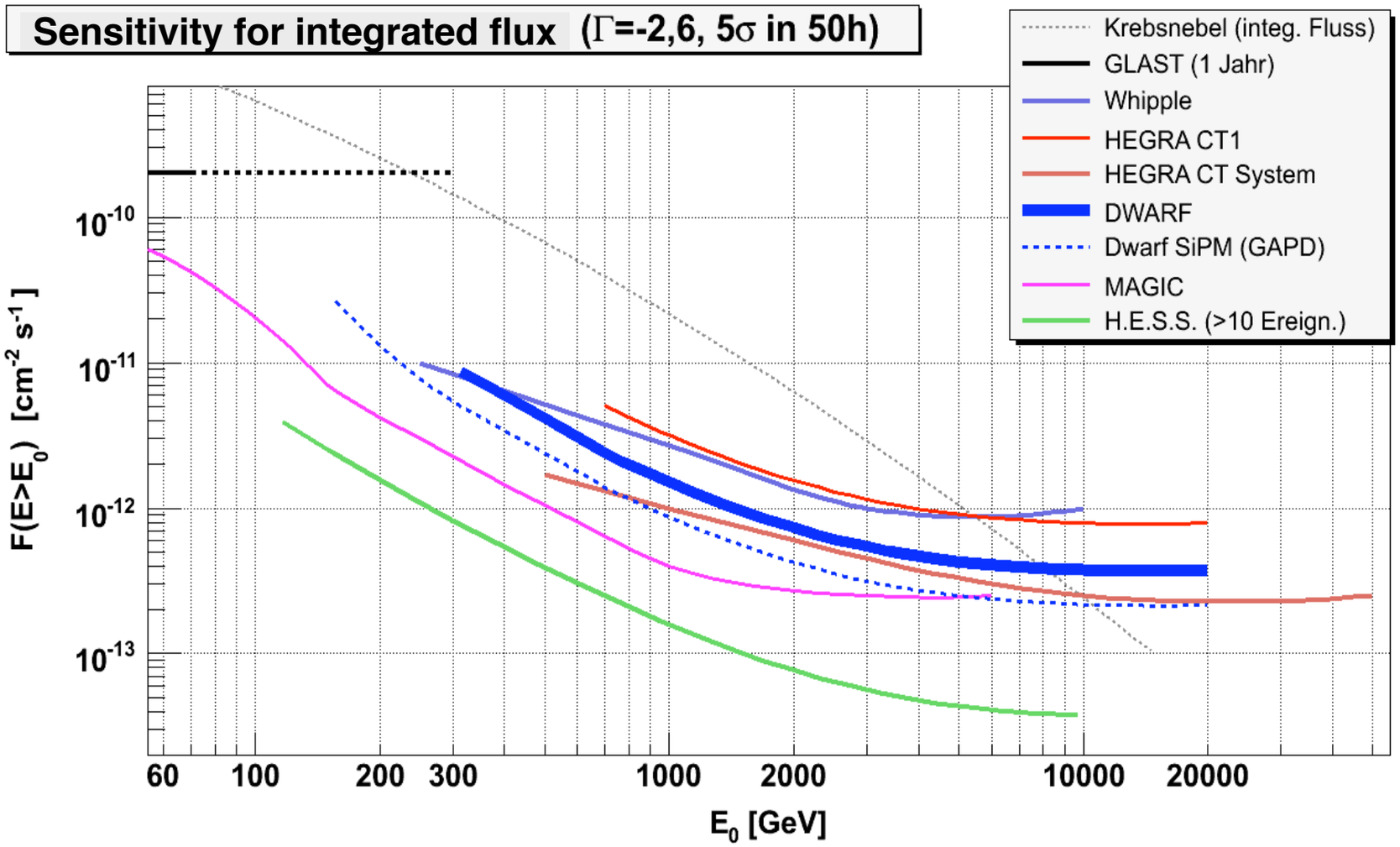


Reflectivity of the mirror



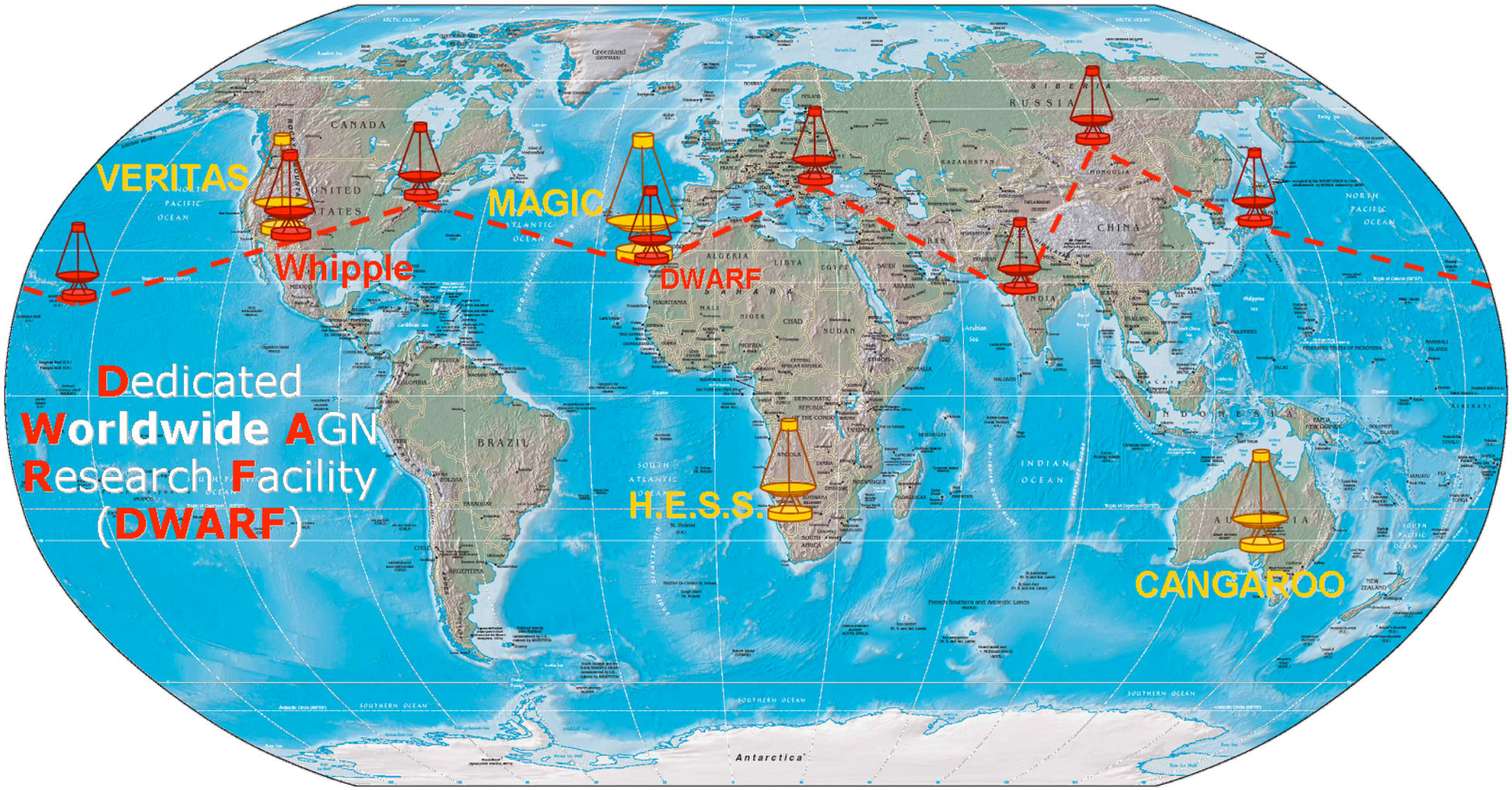
Performance

Sensitivity for integrated flux compared to other IACTs



Vision

Many small telescopes spread around the world would make 24/7 monitoring of AGN possible!



Summary & Outlook

- Long term monitoring of AGN is promising
- Small powerful IACTs most suitable
- DWARF fulfills these requirements

The future:

- multiple DWARF-like telescopes make around the clock observations possible
- robotic operation: less manpower
- other institutions will join